What is claimed is:

1. A method to design a layout for an Internet Datacenter (IDC) cooling, comprising:

defining the IDC as a collection of cells;

pre-characterizing the cells of the IDC;

determining an arrangement of the cells within the IDC; and

determining a profile for one or more parameters of interest for each cell.

2. The method of claim 1, wherein the parameters of interest of a cell include one or more of a maximum temperature, noise, electromagnetic interference, cost, and air flow rate.

3. The method of claim 1, wherein the step of defining the IDC includes one or more of:

modeling components of the IDC as the collection of cells, wherein each of the cells is one of a global and a local type;

assigning characteristics to each of the cells; and

assigning constraints to each of the cells.

4. The method of claim 3, wherein:

the characteristics include one or more of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning; and

the constraints include one or more of placement constraints, upgrade restraints, and dependencies.

5. The method of claim 3, wherein the step of modeling components includes sizing the cells such that interaction between local cells is negligible in a simulation.

6. The method of claim 1, wherein the step of pre-characterizing the IDC comprises one or more of;

generating a look-up table of coefficients of the one or more parameters of interest for each cell; and

and generating a fitting formula of coefficients of the one or more parameters of interest for each cell.

7. The method of claim 6, wherein computational flow dynamics is used to generate one or more of the look-up table and the fitting formula.

8. The method of claim 6, wherein the step of determining the profile for one or more parameters of interest for each cell includes determining one or more values corresponding to each of the one or more parameters of interest for each cell.

9. The method of claim 8, wherein the one or more values of the parameters of interest are determined for each cell based on one or more of:

the cell arrangement;

the look-up table of coefficients;

the fitting formula of coefficients; and

the characteristics of the cell.

10. The method of claim 9, wherein the characteristics include at least one of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning.

11. The method of claim 9, wherein a multiple regression equation is used to determine the one or more values of the parameters of interest for each cell.

12. The method of claim 1, further comprising one or more of:

calculating costs based on the profiles of one or more parameters of interest of the cells; and

verifying solution from the step of determining the profile.

13. The method of claim 12, wherein the calculated cost is measured in one or more of money, power consumption, server density, usability, and efficiency.

14. The method of claim 12, wherein the step of verifying solution includes using computational flow dynamics simulation.

15. The method of claim 1, further including iterating one or more times through the steps of:

calculating costs based on the profiles of one or more parameters of interest of the cells;

optimizing the cell arrangement based on the results of the calculating step;

determining the arrangement of cells based on the optimizing step; and

determining the profile for the one or more parameters of interest.

16. The method of claim 15, wherein the step of optimizing solution includes using at least one of genetic algorithm, simulated annealing algorithm, threshold acceptance algorithm, branch and bound algorithm, and gradient-descent algorithm.

17. A system to design a layout for Internet Datacenter (IDC) cooling, comprising:

a definition module configured to define the IDC as a collection of cells;

a pre-characterization module configured to generate pre-characterization information of the cells of the IDC to a coefficient table;

an arrangement module configured to determine an arrangement of the cells within the IDC; and

a profiler module configured to determine a profile for one or more parameters of interest for each cell based on the pre-characterization information from the coefficient table.

18. The system of claim 17, wherein the parameters of interest of a cell include one or more of a maximum temperature, noise, electromagnetic interference, cost, and air flow rate.

19. The system of claim 17, wherein the definition module is configured to:

model components of the IDC as the collection of cells, wherein each of the cells is one of a global and a local type;

assign characteristics to each of the cells; and

assign constraints to each of the cells.

20. The system of claim 19, wherein:

the characteristics include one or more of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning; and

the constraints include one or more of placement constraints, upgrade restraints, and dependencies.

21. The system of claim 19, wherein the definition module is further configured to size the cells such that interaction between local cells is negligible in a simulation.

22. The system of claim 17, wherein the pre-characterization module comprises:

a computational flow dynamics (CFD) interface module configured to interface with an external source of CFD data;

a look-up table / fitting formulation generation module configured to generate one or more of a look-up table of coefficients and a fitting formula of the one or more parameters of interest for each cell; and

a coordinator module configured to coordinate activities of the CFD interface module and the look-up table / fitting formula generator module and to write the one or more of the look-up table of coefficients and the fitting formula of the one or more parameters to the coefficient table.

23. The system of claim 22, wherein the profiler module is further configured to determine one or more values corresponding to each of the one or more parameters of interest for each cell based the pre-characterization information from the coefficient table.

24. The system of claim 23, wherein the one or more values of the parameters of interest are determined for each cell based on one or more of:

the cell arrangement;

the look-up table of coefficients;

the fitting formula of coefficients; and

one or more characteristics of the cell.

25. The system of claim 20, wherein the characteristics include one or more of a server type, vent tile pitch, orientation, ceiling plenum, floor plenum, and air conditioning.

26. The system of claim 17, further comprising one or more of:

a cost calculate module calculating costs based on the profiles of one or more parameters of interest of the cells; and

verifier module verifying solution from the profiler module.

27. The system of claim 26, wherein the cost calculate module calculates cost measured in one or more of money, power consumption, server density, usability, and efficiency.

28. The system of claim 26, wherein the verifier module is configured to verify solution includes using computational flow dynamics simulation.

29. The system of claim 26, further comprising:

an optimizer module configured optimize solution based on results reached by the cost calculate module.

30. The system of claim 29, wherein the optimizer module utilizes at least one of genetic algorithm, simulated annealing algorithm, threshold acceptance algorithm, branch and bound algorithm, and gradient-descent algorithm.

31. The system of claim 29, wherein the arrangement module is further configured to arrange cells of the IDC based on results of the optimizer module.

32. A system capable of designing a layout for Internet Datacenter (IDC) cooling, comprising:

means to define the IDC as a collection of cells;

means to pre-characterize the cells of the IDC;

means to determine an arrangement of the cells within the IDC; and

means to determine a profile for one or more parameters of interest for each cell.

33. The system of claim 32, wherein the means to define include:

means to model components of the IDC as the collection of cells, wherein each of the cells is one of a global and a local type;

means to assign characteristics to each of the cells; and

means to assign constraints to each of the cells.

34. The system of claim 33, wherein the means to define further includes means to configure sizes the cells such that interaction between local cells is negligible in a simulation.

35. The system of claim 32, further comprising one or more of:

means to calculate costs based on the profiles of one or more parameters of interest of the cells; and

means to verify solution from the means to profile.

36. The system of claim 32, further comprising:

means to optimize solution based on results reached by the means to calculate.

37. The system of claim 36, wherein the means to optimize utilizes at least one of genetic algorithm, simulated annealing algorithm, threshold acceptance algorithm, branch and bound algorithm, and gradient-descent algorithm.

38. The system of claim 37, wherein the means to arrangement arrange cells of the IDC based on results of the means to optimize.